

PATENT CLAIMS

1. A curtain coater for coating a substrate (1) which is moved, comprising:
 - a) a nozzle device (4) for generating a curtain (V) of at least one coating fluid, falling onto the substrate (1);
 - b) and a curtain guiding structure (15) comprising a guiding face (17) which laterally guides the curtain (V);
 - c) wherein the guiding face (17) is convex to the curtain (V) over a width which, measured crossways to the curtain (V), exceeds the curtain thickness.
2. The curtain coater according to claim 1, characterized by the fact that the guiding face (17) is curved crossways to the curtain (V).
3. The curtain coater according to one of the proceeding claims, characterized by the fact that the guiding face (17) is a cylinder face.
4. The curtain coater according to one of the proceeding claims, characterized by the fact that the guiding face (17) forms an arc over its width which exhibits a curvature radius along the arc of at least 5 mm throughout.
5. The curtain coater according to one of the proceeding claims, characterized by the fact that the guiding face (17) forms an arc over its width which extends over an arc angle (η) of at least 60° and less than 180° , wherein when the curvature radius (η) is variable along the arc, the arc angle is related to the mean curvature radius (arithmetical mean) and, if the curvature radius is constant, is related to said curvature radius.
6. The curtain coater according to one of the proceeding claims, characterized by the fact that the guiding face (17) is curved convexly over its width, with a curvature radius of at least 5 mm and at most 50 mm.

7. The curtain coater according to one of the proceeding claims, characterized by the fact that a pipe forms the curtain guiding structure (15).
8. The curtain coater according to one of the proceeding claims, characterized by the fact that an auxiliary fluid can be supplied to the guiding face (17) via a fluid supply (20) connected to the curtain guiding structure (15), and the guiding face (17) can be wetted with the supplied auxiliary fluid.
9. The curtain coater according to the proceeding claim, characterized by the fact that the curtain guiding structure (15) is hollow profile comprising a hollow space (16) and a shell surrounding the hollow space which is permeable to the auxiliary fluid in at least a circumferential segment forming the guiding face (17).
10. The curtain coater according to the proceeding claim, characterized by the fact that at least the circumferential segment of the curtain guiding structure (15) consists of a porous material.
11. The curtain coater according to one of the two proceeding claims, characterized by the fact that the curtain guiding structure (15) is sealed against penetration by the auxiliary fluid, at least over a part of its shell, wherein this part does not form the guiding face (17).
12. The curtain coater according to one of the three proceeding claims, characterized by the fact that an auxiliary fluid, supplied to the guiding face by means of the fluid supply (20) and forming a border coat film (B) which wets the guiding face (17), exhibits a current velocity due to its own weight which corresponds to the fall velocity of the free curtain current (V), at least over a large part of the guiding face (17).
13. The curtain coater according to one of the four proceeding claims, characterized by the fact that the curtain guiding structure (15) consists of a porous material which is permeable to the auxiliary fluid, and a wall thickness of the curtain guiding structure (15) varies at least

in an area forming the guiding face (17), such that it is adapted to the fall velocity of the free curtain current (V).

14. The curtain coater according to one of the proceeding claims, characterized by the fact that the curtain guiding structure (15) is supported on a coordinate table such that it can be adjusted relative to the nozzle device (4).
15. The curtain coater according to one of the proceeding claims, characterized by the fact that a suction means (23, 24) and a separating means (25) protruding into the curtain (V) are provided below the guiding face (17), in order to capture a fluid flowing down the guiding face (17) over the substrate (1) and to suck away the captured fluid.
16. The curtain coater according to the proceeding claim, characterized by the fact that a suction opening (23) of the suction means (23, 24) is formed in an inner edge between the separating means (25) and the guiding face (17) or a face of a holder (18) of the guiding face elongating the guiding face (17).
17. The curtain coater according to one of the two proceeding claims, characterized by the fact that a gap is formed between the separating means (25) and the substrate (1) and is constricted from an end of the separating means (25) protruding into the curtain (V) as far as a narrowest point, and then expands again.
18. The curtain coater according to one of the proceeding claims, the nozzle device comprising:
 - a nozzle surface (5) inclined to the horizontal;
 - an exit opening (7) through which the coating fluid can be supplied to the nozzle surface (5) such that the coating fluid forms a downward-flowing film (F) on the nozzle surface (5);
 - a nozzle lip (6) which forms a downstream end of the nozzle surface (5);
 - and a nozzle boundary (8) for laterally restricting the film current (F).

19. The curtain coater according to the proceeding claim, characterized by the fact that the nozzle side boundary (8) exhibits throughout - from the nozzle lip (6) as far as a point upstream of the nozzle lip (6) - a height, measured to the nozzle surface (5), which at least substantially corresponds to the respectively local thickness of the free film current (F), such that the film current is prevented from flowing over the nozzle side boundary (8) and coating fluid of the film current (F) is prevented from being drawn up the nozzle side boundary (8).
20. The curtain coater according to the proceeding claim, characterized by the fact that the nozzle side boundary (8) exhibits a height adapted in this way to the free film current (F) throughout, from the exit opening (7) as far as the nozzle lip (6).
21. The curtain coater according to one of the two proceeding claims, characterized by the fact that the nozzle device (4) comprises a number of exit openings (7) for coating fluids, in succession in the current direction of the film current (F), in order to be able to form a multiple-coat film current (F) on the nozzle surface (5), and wherein the height of the nozzle side boundary (8) exhibits a height adapted in this way to the free film current (F) as far as at least the extents of the exit openings (7).
22. The curtain coater according to one of the four proceeding claims, characterized by the fact that the nozzle device (4) comprises a fluid supply (11) by means of which an auxiliary fluid can be supplied to the nozzle side boundary (8) in order to form a lubricating film of the auxiliary fluid, which separates the film current (F) from the nozzle side boundary (8), at least in a longitudinal section of the nozzle side boundary (8).
23. The curtain coater according to the proceeding claim, characterized by the fact that the nozzle side boundary (8) comprises a wall structure (10) which is permeable to the auxiliary fluid and connected to the fluid supply (11).
24. The curtain coater according to the proceeding claim, characterized by the fact that the permeable wall structure (10) is formed from a porous material.

25. The curtain coater according to one of the three preceding claims, characterized by the fact that the lubricating film is formed downstream of the exit opening (7) or a most downstream exit opening of a number of exit openings (7).
26. The curtain coater according to one of the eight preceding claims, characterized by the fact that an upper periphery of the nozzle side boundary (8) is formed as an edge (9) with an enclosed edge angle (A) of at most 90° , preferably at most 80° .
27. The curtain coater according to the preceding claim, characterized by the fact that the edge angle (A) measures at least 30° .
28. The curtain coater according to one of the preceding claims, characterized by the fact that at least one suction nozzle (27) is arranged at at least one of the two peripheries of the coated substrate (1), for sucking away a peripheral bulge (2') of the coating fluid deposited on the substrate (1).
29. A curtain coating method, with a curtain (V) of at least one coating fluid deposited, free-falling, on a substrate (1) which is moved, and is guided on both sides, in each case by means of a convex guiding face (17) crossways to the curtain (V).